

## ABSTRACT

Disclosed are virulent or opportunistic prokaryotes in which metal ion-dependent gene regulation confers a growth or an infectious advantage. The prokaryote contains a DNA molecule containing a sequence encoding a dominant, metal ion-independent repressor protein or a partially metal-ion independent repressor protein. The prokaryotes are formulated into vaccine compositions and administered to a human or other animal to enhance protective immunity against infectious and diseases caused by prokaryotes in which metal ion-dependent gene regulation confers a growth or an infectious advantage.

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